Development of ICT Instructional Materials Based on Needs Identified by Malaysia Secondary School Teachers

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Abstract

For the last few years school teachers in Malaysia have access to ICT tools in their schools. However, these tools are used mostly for record keeping and word processing purposes. An in-depth study to identify the problems of using ICT in the classroom is currently being done to elicit information concerning the needs of secondary school teachers in the Northern region of Malaysia. This research-in-progress paper discusses the needs analysis phase of the study. The teachers were asked to identify their needs in becoming competent users of ICT in the classroom; the result from this study will be used to create specific topics that will be made accessible on-line to be shared by teachers in Malaysia. The ultimate aim of this study is to develop reusable instructional material in the form of learning objects.

Keyword: Diffusion of Innovation, ICT, ICT Integration, Instructional Design, Learning Objects, Teacher Education

Introduction

Over the last twenty years, the Ministry of Education (MOE) in Malaysia has embarked on many different projects on the use of ICT in the schools. Some of these projects include Computer Literacy, Computers in Education, Smart Schools, and the latest is the use of ICT for a program entitled, English for Teaching Mathematics and Science. According to a report on Malaysia's ICT use in Education by UNESCO, in 2003, the MOE budgeted 30 per cent of its annual budget (approximately MYR 4.2 billion) to connect 230 rural schools to the Internet: 120 with ISDN lines, 100 with PSTN lines, and 10 with VSAT connection. It is expected that in 2003, almost all educational institutions will have at least one computer laboratory equipped with Pentium class PCs. This is to say about 75 per cent to 90 per cent of schools and 100 per cent of universities will have access to the Internet through either dial-up, broadband, leased line or cable-broadband connection. The use of ICT in Malaysia is fueled by the government's initiatives such as the Malaysian Superhighway Corridor (MSC) and Vision 2020 which emphasizes the use of ICT as the main impetus in bringing Malaysia into the digital and global 21st century.

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Research Background

The Problem

Since 1996 we have conducted yearly surveys on the use of technology for teaching and learning amongst in-service teachers pursuing their bachelor's degree at Universiti Sains Malaysia (USM). These in-service teachers are basically teachers with 3-5 years of teaching experience in the primary schools. The teachers who participated in these surveys were those enrolled in an introductory course in educational technology at our centre. The results of these surveys have shown us that although accessibility is no longer an issue for most primary school teachers in our studies; computers are only being used as a glorified typewriter (Masood & Ngah, 2003; Ngah, 1998, 1999, 2000; Ngah & Masood, 2004; Ngah & Samsudin, 1997). While ICT has reached most of the schools in Malaysia, there are numerous problems with the diffusion of computer technology as part of teaching and learning at the school system in Malaysia.

Since accessibility and availability of ICT is no longer a problem, why are teachers not using the ICT in their classrooms? Currently there is no data available on what the teachers are doing with the ICT available in their classrooms. Since our previous surveys are limited to in-service teachers pursuing their degree at Universiti Sains Malaysia, we feel that the time has come for a more in-depth study on the use of computers for teaching and learning amongst secondary school teachers in Malaysia. It should be mentioned that problems with technology usage by teachers are not limited to developing countries like Malaysia. According to Laffey (2004), current in-service teachers are not adequately prepared for teaching technology implying an inadequacy in the technology training of teachers. Shuldman's (2004) study on the current state of technology integration revealed that creating a better understanding of how technology can be applied in normal classrooms may be part of the solution to the problem of technology integration. Reynolds, Treharne and Tripp (2003) concluded that more research is needed to improve the expectations and efficiency of ICT provision and deployment. The Ministry of Education in Malaysia has several objectives for the infusion of ICT in Education. These include proper preparation of sufficient and up-to-date tested ICT infrastructure and equipment, the dissemination of ICT curriculum and assessment and the emphasis of integration of ICT in teaching and learning, upgrading the knowledge and skills of ICT for students and teachers and last but not least the upgrading of the maintenance and management of ICT equipment in all educational institutions. We feel that these objectives can only be achieved with an understanding of teachers' perception and willingness to use the technology in teaching and learning. Therefore, it is imperative that this research project be conducted as a baseline data for a needs assessment for future planning and implementation of ICT into the classrooms. According to Willis, Thompson, and Sadera (1999), among other things, research in technology and teacher education needs further investigation in the area of instructional design, diffusion of innovation, and development and dissemination of resources and tools for using technology effectively.

Our experience in the field has led us to believe that barriers to the use of computers by teachers have an intrinsic component that needs further exploration. Some of the intrinsic elements suggested by Ertmer, Addison, Lane, Ross, and Woods (1999) are: belief in teaching, belief about computers, classroom practices, and the unwillingness to change. Abrami (in Reynolds, Treharne & Tripp, 2003) stresses that the value, expectation to succeed, and the acceptable costs in using technology for learning are key to effective use of technology in schools. For this study, Roger's (1995) five perceived attributes of innovations, namely relative advantage, compatibility, complexity, triability, and observability will be used as the framework for the study of diffusion of innovation in the research. In addition to the above, our past experience has shown us that

perceived support on use of technology (both technical and administrative) is another important factor that may contribute to the successful diffusion of ICT into the classroom.

To be a global player in ICT, Malaysian schools, i.e. Malaysian schools teachers, need to have comparable standards of ICT usage with that of other fully developed countries. Currently there are no standards and competencies for pre-service and in-service training of teachers in ICT to adhere to. Benchmarking the current usage with the standards in US, for example, will show the gap that needs to be filled to attain similar standard. Identification of skills needed by our teachers will focus our resource on creating reusable learning objects on these critical skills.

Objectives

This study is part of our continuing effort to monitor the ICT usage amongst secondary school teachers in Malaysia. The main objective for this study is to contribute to the successful diffusion of ICT as a tool for teaching and learning amongst these teachers. The more specific objectives of the study are:

1. to identify the factors for successful/non-successful implementations of ICT integration into the classroom
2. to have a baseline data on the availability and type of ICT usage amongst secondary schools
3. to identify the gap between the current ICT skill in Malaysia and the ICT standard amongst teachers in the western countries, notably US
4. to create learning objects on critical skills identified in (3) needed by teachers to be a competent ICT user for successful diffusion of ICT into the classroom
5. to explore the sustainability issues concerning the adoption of computers as a teaching and learning tool

The study is conducted in two phases: Phase I is currently in progress and it is a needs assessment to identify the availability and type of ICT usage amongst secondary schools and the same time to identify materials for further development as learning objects thus answering the first three research questions, Phase II will focus on the design and development of the learning objects. This paper will basically discuss the first phase including the preliminary findings as of March, 2006. If time permits, further findings will be presented during the presentation.

Methodology

Sample

As of March 2006, about 1200 questionnaires were sent to 44 randomly selected urban and rural secondary school teachers in the northern region of Malaysia. Currently there are about 291 secondary schools in the northern region which represent 15% of the total number of secondary schools in Malaysia.

Data Collection Method

Survey questionnaire that was used in the earlier study by authors was revised and a component on the identification by the teachers on ICT area needed for further training was included. The survey questionnaire is comprised of several components; a) demography, b) experience in using ICT as a teaching and learning tool, c) attitude towards computers, d) usage of school resource center, e) areas that need further training, g) issues in innovation and diffusion and (h) reflections on use of technology with respect to their career, teaching and learning, and personal life.

As permission from the Ministry of Education and State Department are required to conduct research in Malaysia, the first few months of 2006 were spent in obtaining the necessary paperwork to allow us to proceed with the research.

A pilot study was done on thirty in-service teachers to further improve the questionnaire. Result of this pilot study is discussed below. Refer to Appendix A for the topics identified in the research.

Preliminary Results

Data collected from the pilot study have resulted in further fine-tuning of the questionnaire notably in section (e) which relates to areas that need further training. This includes further modifications and the additions of categories of ICT skills into Software, Hardware, Instructional Technology, and Information Literacy (see Table 1 for the final version of section (e)).

The data also revealed that more than 80% of the skills identified in the questionnaire were selected by the teachers as "highly needed". As it is impossible to create these topics as learning objects within the time frame for the research, the survey was further refined to force the teachers to identify the five most needed ICT skills for their teaching and learning.

The target audience for the pilot study is consisted of teachers within the age of 26-44 years, with a minimum of four and a maximum of twenty years teaching experience. All but two of them have their own computers and owning a computer is the norm for school teachers in Malaysia. Our earlier study revealed a trend in increased computer ownership amongst school teachers over the last eight years. Computer ownership, without the appropriate accompanying skills in the use of ICT as a teaching and learning tool, is not a sufficient condition for the integration of ICT into the classroom. As stated above, the teachers felt that they need much of the skills identified in the questionnaire.

The open-ended section of the survey which ask for the teachers' reflections on the use of ICT with respect to their careers, teaching and learning tools and in their personal lives have revealed a lot of important and interesting information. In general, the teachers felt that the use of ICT in their career will help increase the quality of their job. At the same, ICT has the potential to motivate students and provide another means of resource for information. Personally, skills and knowledge in ICT will increase their confidence in seeking information for both professional and personal use.

Limitations

There several limitation to this research. These include:

a) Centralization of the Malaysian education system

   Although the Malaysian educational system is centralized, there are differences between the regions in Malaysia with respect to variation in cultural backgrounds, state governance, race, and school type. However, the population of this study is the secondary school teachers in the northern region of Malaysia. This limitation is due to financial constraint therefore nationwide study is not feasible.

b) Type of School

   There are many different type of secondary schools in Malaysia including national government funded school, the Chinese vernacular, residential, privately-funded, and religious (both public and private) schools. This study is focused only on government funded daily schools.

c) Ergonomic Issues

Although the authors are aware of the ergonomic issues concerning the design of teaching ICT laboratory, the questionnaire did not include a section on this topic as the scope of research did not include matters pertaining to this area.

d) Data Collection Method

Data collected is through survey questionnaires. Focus group interviews may be conducted to further clarify issues arising from the data collected from the survey questionnaire. If necessary, one-to-one interviews on randomly selected sample will further be conducted to get in-depth information on the specific topic to be further developed into learning objects.

Further Research

This section will discuss further research with respect to the two phases of the study.

Phase I

As the population of this study is the secondary school teachers in the northern region of Malaysia, nation-wide study should be done to confirm the findings to a more general population encompassing the whole of Malaysia. Further samples should include bigger geographical location and type of schools.

Ergonomic issues have become a common theme in the integration of ICT in the classroom. This research did not address this issue. Further research in the use of ICT in the classroom should take into consideration the importance of ICT and the types of action that can be taken to provide an ergonomically design ICT-enriched learning environment. For this purpose, technology coordinator must be included as part of the sample in further research.

The ultimate aim of this research is to provide the appropriate skills needed by teachers to feel confident and comfortable in using and integrating ICT into the classroom. Most of the time, the diffusion and meanings of technology on the teachers are rather personal in nature. This type of experiences can only be captured through their personal communication. As such, qualitative approach should be used to give an in-depth investigation into the needs of the teachers.

Phase II

Based on the data collected during the first phase, learning objects on critical and missing skills identified in Phase I will be created. At the same time, a standard for Malaysian school teachers will be developed using the benchmark set by ISTE National Educational Technology Standards for Teachers (http://cnets.iste.org/teachers/t_stands.html). This will basically focus on ICT training for both pre- and in-service teachers, defining the fundamental concepts, knowledge, skills, and attitudes for applying ICT in teaching and learning environment.

For this phase a development research approach (Richey & Nelson, 1996) will be taken where rapid prototyping model will be used in the design and development of the learning objects using.

At this point we are looking at various possibilities in developing the learning objects using for example, Dreamweaver as the engine or working closely with the School of Computer Science to create learning object templates. Our expertise as instructional designers will be used to incorporate appropriate instructional strategies to present specific topics for the content. Subject-matter experts will be consulted as needed.

These learning objects will be made available online to the Malaysian school teachers. There are several existing portals created for teachers and general public alike such as Cikgunet, SchoolNet,

and Malaysian Grid for Learning (MyGfL at http://www.mygfl.net.my/mygfl/). MyGfL is a national e-Learning initiative undertaken by MIMOS Berhad and the Ministry of Education to promote and support the lifelong learning agenda in Malaysia through the use of ICT to accelerate growth of K-Society.

Conclusion

This paper presented the preliminary result of the first phase of a two-phase research project to identify the ICT-skills needed by teachers with the ultimate aim of creating learning objects to be made available online. At this point, the result of the study has shown us that although access to ICT is not a problem; teachers felt they lack the necessary skills to integrate ICT into their classroom. As the skills identified by the teachers are many and varied, further refinement on the final questionnaire was done to orientate the teachers to focus on the five most needed skills for their teaching and learning. The five most frequently selected topics will be created as learning objects. Further findings will be discussed in the presentation.

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